We claim:

1. A process for partially oxidizing propene to acrylic acid in the gas phase under heterogeneous catalysis by conducting a starting reaction gas mixture comprising propene, molecular oxygen and at least one inert gas, and containing the molecular oxygen and the propene in a molar $O_2 : C_3H_6$ ratio of ≥ 1, in a reaction stage over a fixed catalyst bed whose active composition is at least one multimetal oxide comprising the elements Mo, Fe and Bi, in such a way that

- the fixed catalyst bed is arranged in two spatially successive temperature zones A, B,

- both the temperature of temperature zone A and the temperature of temperature zone B are a temperature in the range from 290 to 380°C,

- the fixed catalyst bed consists of at least two spatially successive fixed catalyst bed zones, and the volume-specific activity within one fixed catalyst bed zone is substantially constant and increases sharply in the flow direction of the reaction gas mixture at the transition from one fixed catalyst bed zone to another fixed catalyst bed zone,

- the temperature zone A extends up to a conversion of the propene of from 40 to 80 mol%,

- on single pass of the starting reaction gas mixture through the entire fixed catalyst bed, the propene conversion is ≥90 mol% and the selectivity of acrolein formation based on converted propene is ≥90 mol%,

the sequence in time in which the reaction gas mixture flows through the temperature zones A, B corresponds to the alphabetic sequence of the temperature zones,

- the hourly space velocity of the propene contained in the starting reaction gas mixture on the fixed catalyst bed is ≥90 l (STP) of propene/l of fixed bed catalyst··h

- the difference $T^{maxA} - T^{maxB}$, formed from the highest temperature T^{maxA} which the reaction gas mixture has within temperature zone A, and the highest temperature T^{maxB} which the reaction gas mixture has within temperature zone B is ≥0°C,

wherein the transition from temperature zone A to temperature zone B in the fixed catalyst bed does not coincide with a transition from one fixed catalyst bed zone to another fixed catalyst bed zone.

2. A process as claimed in claim 1, wherein T^{maxA} - T^{maxB} is ≥3°C and ≤70°C.

3. A process as claimed in claim 1, wherein T^{maxA} – T^{maxB} is ≥20°C and ≤60°C.

4. A process as claimed in any of claims 1 to 3, wherein the propene hourly space velocity on the fixed catalyst bed is ≥90 l (STP)/l·h and < 160 l (STP)/l·h.

5. A process as claimed in any of claims 1 to 3, wherein the propene hourly space velocity on the fixed catalyst bed is ≥160 l (STP)/l·h and ≤ 300 l (STP)/l·h.

6. A process as claimed in any of claims 1 to 5, wherein the temperature of reaction zone A is from 305 to 365°C.

7. A process as claimed in any of claims 1 to 5, wherein the temperature of reaction zone A is from 310 to 340°C.

8. A process as claimed in any of claims 1 to 7, wherein temperature zone A extends to a propene conversion of from 50 to 70 mol%.

9. A process as claimed in any of claims 1 to 8, wherein temperature zone A extends to a propene conversion of from 60 to 70 mol%.

10. A process as claimed in any of claims 1 to 9, wherein the O_2:propene ratio in the starting reaction gas mixture is from 1 to 2.

11. A process as claimed in any of claims 1 to 10, wherein the chemical composition of the active composition used is unchanged over the entire fixed catalyst bed.

12. A process as claimed in any of claims 1 to 11, wherein the entire fixed catalyst bed comprises not more than 4 fixed catalyst bed zones.

13. A process as claimed in any of claims 1 to 12, wherein, when the active composition is uniform over the entire fixed catalyst bed, the volume-specific active composition in the flow direction of the reaction gas mixture increases by at least 5%

by weight at the transition from one fixed catalyst bed zone to another fixed catalyst bed zone.

14. A process as claimed in any of claims 1 to 12, wherein, when the active composition is uniform over the entire fixed catalyst bed, the difference in the volume-specific active composition between the fixed catalyst bed zone having the lowest volume-specific activity and the fixed catalyst bed zone having the highest volume-specific activity is not more than 40% by weight.

15. A process as claimed in any of claims 1 to 14, wherein, when the active composition is uniform over the entire fixed catalyst bed, the difference in the volume-specific active composition between the fixed catalyst bed zone having the lowest volume-specific activity and the fixed catalyst bed zone having the highest volume-specific activity is not more than 40°C by weight.

16. A process as claimed in any of claims 1 to 15, wherein the last fixed catalyst bed zone in the flow direction of the reaction gas mixture is undiluted and consists only of shaped catalyst bodies.

17. A process as claimed in any of claims 1 to 16, wherein the fixed catalyst bed zone having the highest volume-specific activity does not extend into temperature zone A.

18. A process as claimed in any of claims 1 to 17, wherein there is no transition from one fixed catalyst bed zone to another fixed catalyst bed zone in the fixed

19. catalyst bed within the range of $X \pm L \cdot \frac{4}{100}$ where L is the length of the fixed catalyst bed and X is the point within the fixed catalyst bed of transition from temperature zone A to temperature zone B.